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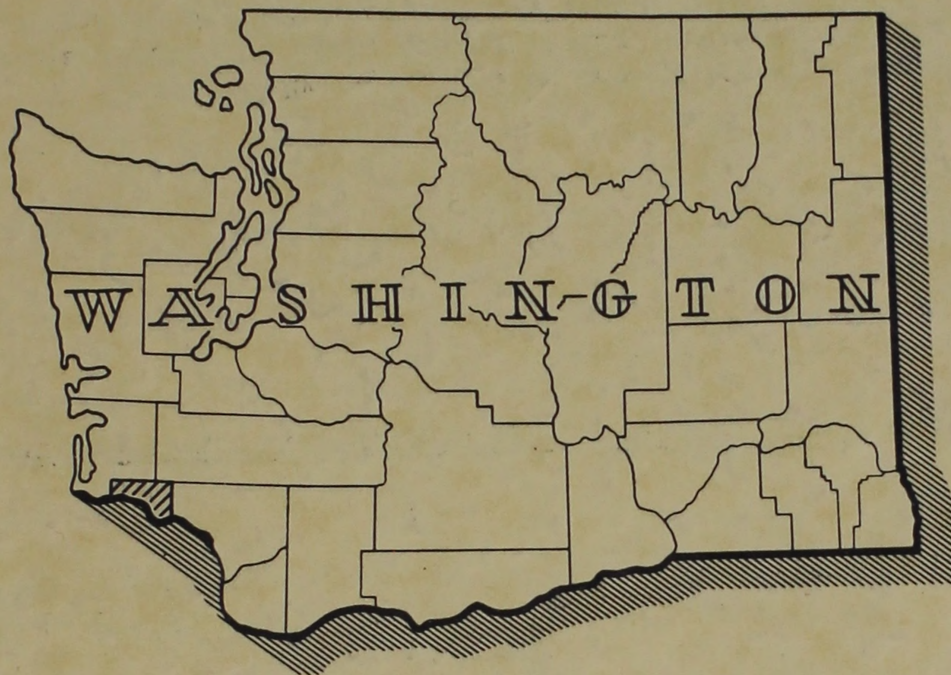
# FOREST STATISTICS FOR WAHKIAKUM COUNTY, WASHINGTON

FOREST SURVEY REPORT NO. 106



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U. S. DEPARTMENT OF AGRICULTURE      FOREST SERVICE  
PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION  
R. W. COWLIN, DIRECTOR

PORTLAND, OREGON



OCTOBER 1952

PREPARED BY THE DIVISION OF FOREST ECONOMICS

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# FOREST STATISTICS

FOR

WAHKIAKUM COUNTY, WASHINGTON

Forest Survey Report No. 106

by

F. L. Moravets

U. S. Department of Agriculture      Forest Service  
Pacific Northwest Forest and Range Experiment Station

R. W. Cowlin, Director  
October      1952

## FOREWORD

This publication summarizes in statistical form the results of a reinventory of the forests of Wahkiakum County, Washington, conducted in 1949. This reinventory is a part of the maintenance phase of the Forest Survey, a Nation-wide project of the Forest Service authorized by the McSweeney-McNary Forest Research Act of 1928 and amended June 25, 1949. The sixfold purpose of the project is: (1) To make an inventory of the extent and condition of forest lands and of the present supply of timber and other forest products on these lands; (2) to ascertain the rate at which this supply is being increased through growth, and the potential growth on forest areas; (3) to determine the extent of depletion of the forests through cutting and through loss from fire, insects, disease, windthrow, and other causes; (4) to determine the present consumption and the probable future trend in requirements for timber and other forest products; (5) to analyze and correlate these findings with other economic data, as an aid in the formulation of private and public policies for most effective and rational use of land suitable for forest production, and (6) to make such resurveys as are necessary to keep the basic information up to date.

The Forest Survey is conducted in the various forest regions of the Nation by the regional forest experiment stations of the Forest Service. In the Pacific Northwest region of Oregon and Washington it is an activity of the Pacific Northwest Forest and Range Experiment Station at Portland, Oregon.

Under the initial phase of the Forest Survey Wahkiakum County was inventoried in 1931. Later the inventory was adjusted to January 1933 and a statistical report, "Forest Statistics for Wahkiakum County, Washington," and a detailed forest type map—scale 1 inch to the mile—were released. In 1940 the first reinventory of the county was made and a revised statistical report and forest type map prepared.

Following the second reinventory, in 1949, the forest type map has again been revised 1/.

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1/ A print of the forest type map is available at cost of blueprinting. For information write Director, Pacific Northwest Forest Experiment Station, 423 U. S. Court House, Portland 5, Oregon.



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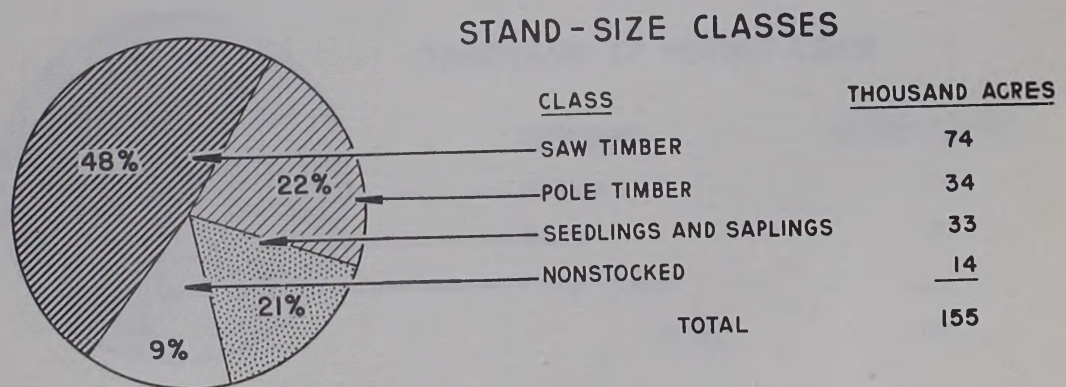
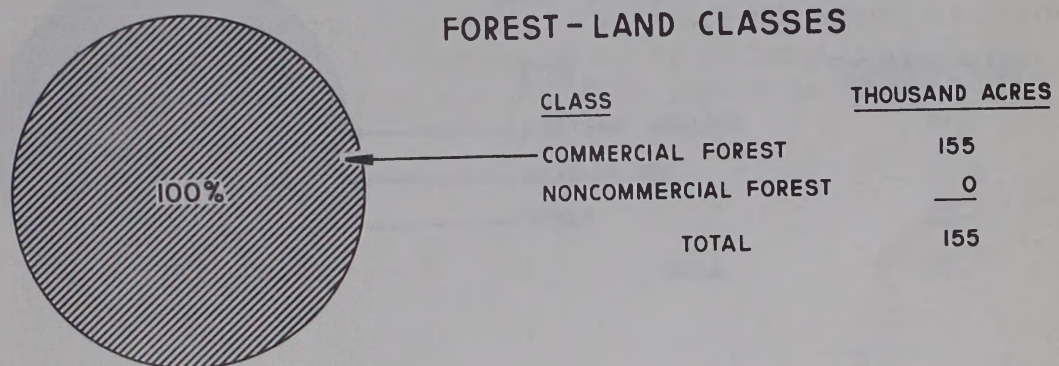
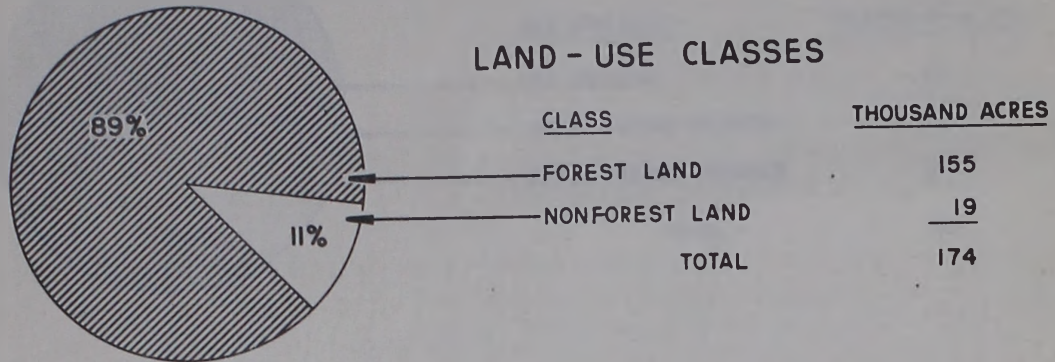
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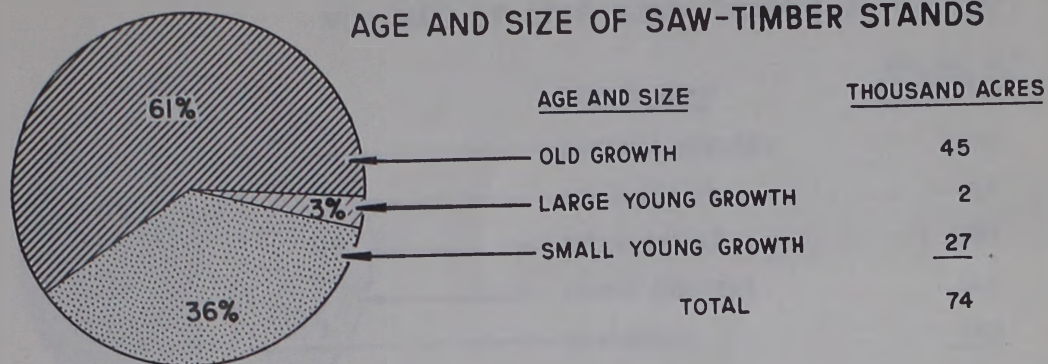
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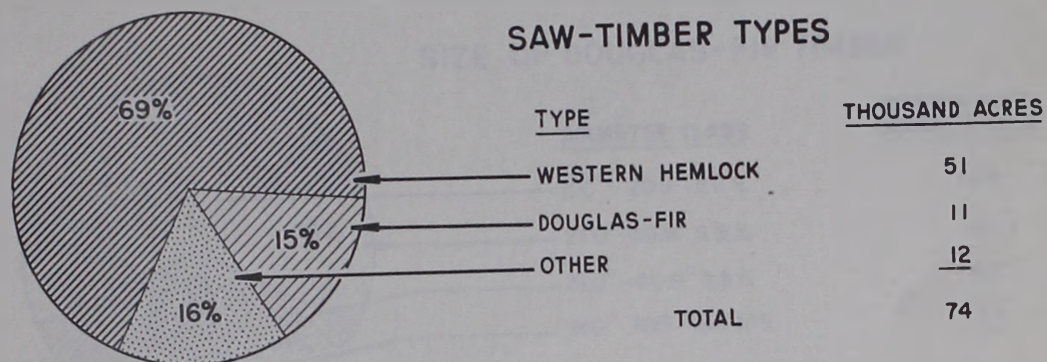
# SIGNIFICANT SURVEY FINDINGS



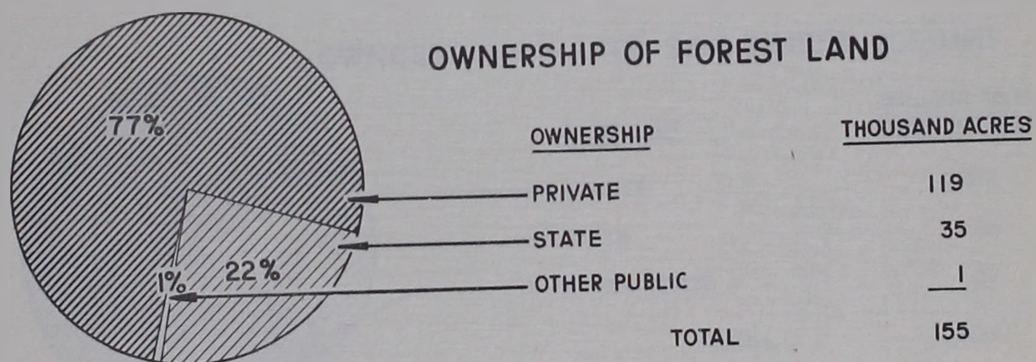
### AGE AND SIZE OF SAW-TIMBER STANDS



### SAW-TIMBER TYPES

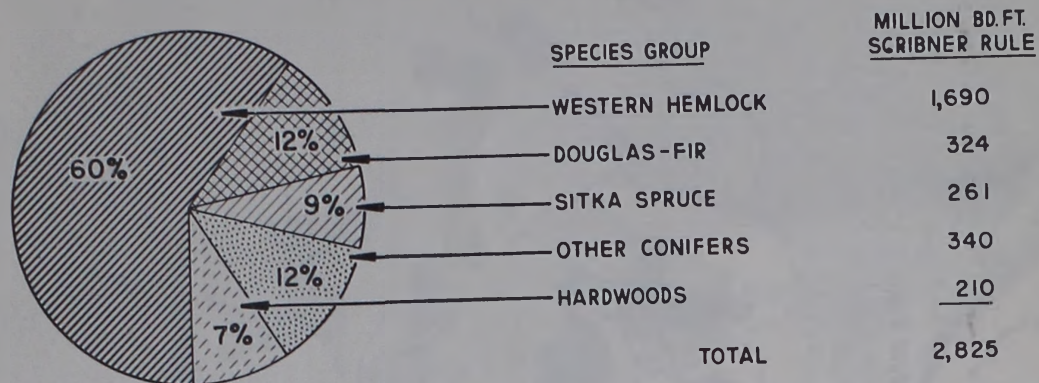


### OWNERSHIP OF FOREST LAND

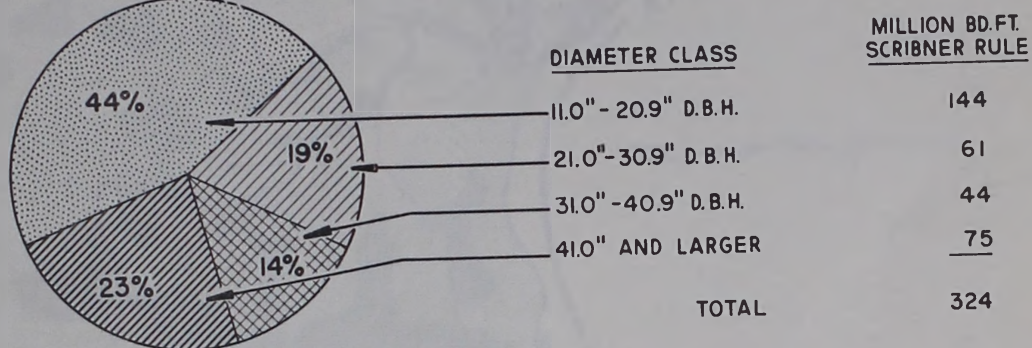




## VOLUME OF LIVE SAW-TIMBER BY SPECIES



## SIZE OF DOUGLAS-FIR TIMBER



## OWNERSHIP OF LIVE SAW-TIMBER VOLUME

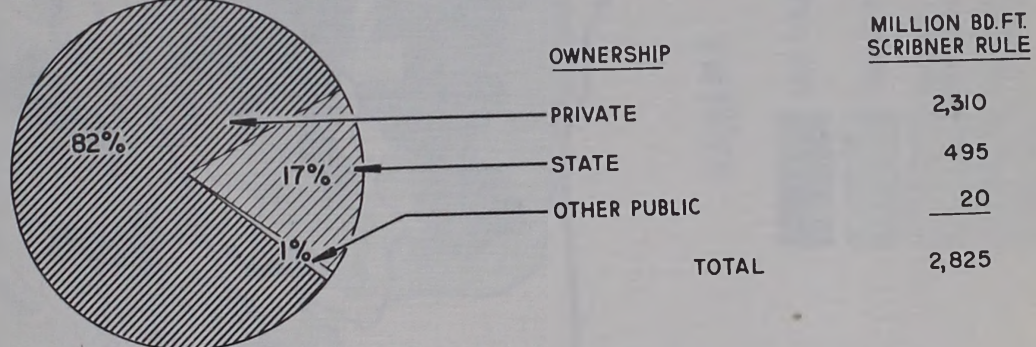




FIGURE 1  
OUTLINE MAP OF WAHKIAKUM COUNTY, WASHINGTON  
1949

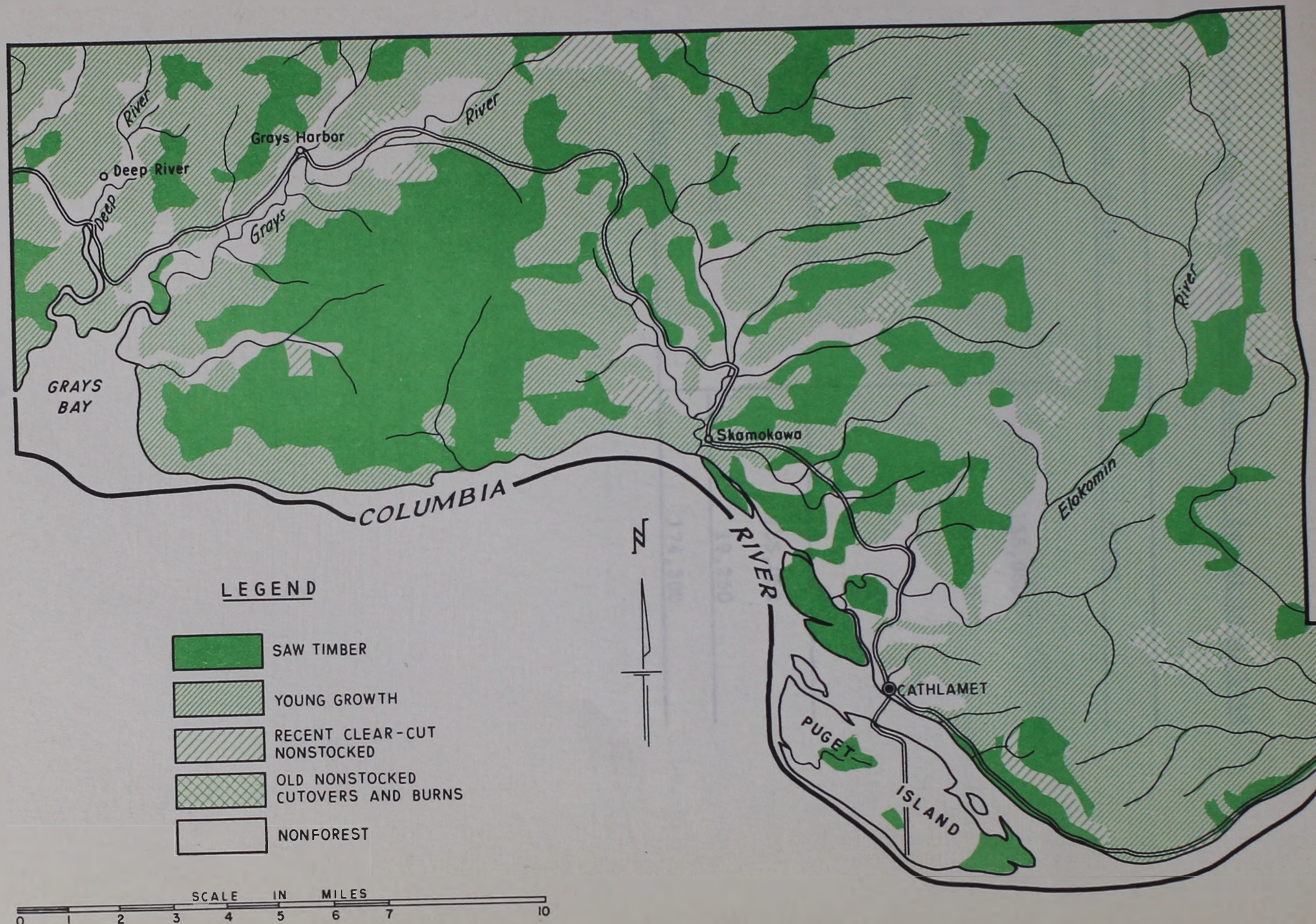




Table 1.—Land area by major classes of forest land, 1949

Class of land	Acres
Forest land	
Commercial	155,050
Noncommercial	0
Reserved	
Commercial	0
Noncommercial	0
Total	155,050
Nonforest land	19,250
<u>Total land</u>	<u>174,300</u>

Table 2.--Commercial forest land area by ownership class by  
stand-size class, 1949

Ownership class	Total <u>Acres</u>	Saw- timber stands <u>Acres</u>	Pole- timber stands <u>Acres</u>	Seedling and sapling stands <u>Acres</u>	Non- stocked areas <u>Acres</u>
Federally owned or managed					
Public domain	200	200			
Total Federal	200	200			
State	35,310	12,710	8,720	9,250	4,630
County	230	170	20	40	
Municipal	680	160	520		
Private	118,630	61,080	24,140	23,700	9,710
Total all ownerships	155,050	74,320	33,400	32,990	14,340



Table 3.—Commercial forest land area by forest type by  
stand-size class, 1949

Forest type	Total Acres	Saw-timber stands			Pole- timber stands Acres	Seedling and sapling stands Acres	Non- stocked areas Acres
		Old growth Acres	Large young growth Acres	Small young growth Acres			
Douglas-fir	25,810	520	2,070	8,100	9,310	5,810	
Western hemlock	96,300	39,870		11,420	18,660	26,350	
Sitka spruce	4,000	3,140		370	490		
Western redcedar	840	640				200	
True fir-mountain hemlock	560	560					
Hardwoods	13,200	890		6,740	4,940	630	
Nonstocked areas	14,340						14,340
Total	155,050	45,620	2,070	26,630	33,400	32,990	14,340

Table 4.--Area of commercial and noncommercial forest land and nonforest land in  
Wahkiakum County, Washington, by ownership and cover type, as of 1949

(Acres)

Survey type symbol	Cover type	Total	Unreserved				Federal public domain
			Private	State	County	Municipal	
All lands							
	Forest land	155,050	118,630	35,310	230	680	200
	Nonforest land	19,250	18,860	360	10	20	
	Total	174,300	137,490	35,670	240	700	200
Commercial forest land							
D5	Douglas-fir large old-growth saw timber (yellow fir)	520	480	40			
D4	Douglas-fir large young- and old-growth saw timber (red fir)	2,070	1,910	80		80	
D3	Douglas-fir small young-growth saw timber	8,100	7,000	1,020	40	40	
D2	Douglas-fir pole timber	9,310	5,960	3,110		240	
D1	Douglas-fir seedlings and saplings	5,810	2,540	3,270			
H4	Western hemlock large saw timber	39,870	32,150	7,500	100		120
H3	Western hemlock small saw timber	11,420	8,940	2,400			80
H2	Western hemlock pole timber	18,660	13,450	4,910	20	280	
H1	Western hemlock seedlings and saplings	26,350	20,370	5,980			
S4	Sitka spruce large saw timber	3,140	2,980	160			
S3	Sitka spruce small saw timber	370	370				
S2	Sitka spruce pole timber	490	470	20			
C4	Western redcedar large saw timber	640	640				
C1	Western redcedar seedlings and saplings	200	160		40		
FM4	True fir-mountain hemlock large saw timber	560	440	120			
HD4	Hardwood large saw timber	890	890				
HD3	Hardwood small saw timber	6,740	5,280	1,390	30	40	
HD2	Hardwood pole timber	4,940	4,260	680			
HD1	Hardwood seedlings and saplings	630	630				
X	Recent clear-cut area nonstocked	4,710	3,020	1,690			
XO	Old clear-cut area nonstocked	9,310	6,450	2,860			
F	Area deforested by fire	320	240	80			
	Total	155,050	118,630	35,310	230	680	200
Nonforest land							
O	Open--nonvegetative	1,220	1,220				
G	Grass and brush	80	80				
A	Agricultural	17,950	17,560	360	10	20	
	Total	19,250	18,860	360	10	20	



Table 5.--Area of commercial forest land by generalized forest type  
and ownership class, 1949

(Acres)

Generalized forest type	Total	Unreserved				Federal public domain
		Private	State	County	Municipal	
Conifer saw timber:						
Types D3, D4, D5, H3, H4, Virgin	37,150	29,290	7,620	120	40	80
S3, S4, C4, and FM4.	29,540	25,620	3,700	20	80	120
Selectively cut						
Total	66,690	54,910	11,320	140	120	200
Conifer pole timber:						
Types D2, H2, and S2						
On cutovers	28,260	19,820	7,900	20	520	
On burns	200	60	140			
Total	28,460	19,880	8,040	20	520	
Conifer seedlings and saplings:						
Types D1, H1, and C1						
On cutovers	30,520	21,670	8,850			
On burns						
On plantations	1,840	1,400	400	40		
Total	32,360	23,070	9,250	40		
Recent clear-cut areas, nonstocked:						
Type X	4,710	3,020	1,690			
Nonstocked clear-cut or burned over areas:						
Types X0 and F	9,630	6,690	2,940			
Hardwoods:						
Saw timber: Types HD3 and HD4	7,630	6,170	1,390	30	40	
Pole timber: Type HD2	4,940	4,260	680			
Seedlings and saplings: Type HD1	630	630				
Total	13,200	11,060	2,070	30	40	
Total	155,050	118,630	35,310	230	680	200



Table 6.—Volume of live saw timber<sup>1/</sup> and primary growing stock<sup>2/</sup>  
on commercial forest land by ownership class, 1949

Ownership class	Live saw timber		Primary growing stock
	<u>Million bd.ft.</u> <u>log scale,</u> <u>Scribner rule</u>	<u>Million bd.ft.</u> <u>International</u> <u>4-inch rule</u>	<u>Million</u> <u>cubic feet</u>
Federally owned			
Public domain	7	8	1
Total Federal	7	8	1
State	495	536	104
County	6	7	1
Municipal	7	8	2
Private	2,310	2,506	464
Total all ownerships	2,825	3,065	572

1/ Includes live trees 11.0 inches diameter breast height and larger measured in board feet.

2/ Includes live trees 5.0 inches diameter breast height and larger measured in cubic feet.



Table 7.—Volume of live saw timber and primary growing stock on commercial forest land by stand-size class, 1949

Stand-size class	Live saw timber		Primary growing stock
	<u>Million board feet, log scale, Scribner rule</u>	<u>Million board feet, International 4-inch rule</u>	<u>Million cubic feet</u>
Saw-timber stands	2,708	2,938	511
Pole-timber stands	85	92	50
Seedling and sapling stands	26	28	9
Nonstocked areas	6	7	2
Total all stands	2,825	3,065	572

Table 8.—Volume of live saw timber and primary growing stock  
on commercial forest land by species, 1949

Species	Live saw timber		Primary growing stock
	<u>Million board feet</u> <u>log scale</u> <u>Scribner rule</u>	<u>Million board feet</u> <u>International</u> <u>4-inch rule</u>	<u>Million</u> <u>cubic feet</u>
Softwoods:			
Douglas-fir	324	357	87
Western hemlock	1,690	1,825	306
Western redcedar	136	145	25
Sitka spruce	261	276	40
Pacific silver fir	190	206	39
Grand fir	13	14	3
Noble fir	1	1	-
Total softwoods	2,615	2,824	500
Hardwoods:			
Red alder	193	222	65
Bigleaf maple	15	16	6
Black cottonwood	2	3	1
Total hardwoods	210	241	72
Total all species	2,825	3,065	572



Table 9.—Volume of live Douglas-fir saw timber on  
commercial forest land by  
diameter-class group, 1949

Diameter class	Total
11.0" to 20.9" d.b.h. Million bd.ft. log scale, Scribner rule	144
Million bd.ft. Inter- national $\frac{1}{4}$ -inch rule	167
21.0" to 30.9" d.b.h. Million bd.ft. log scale, Scribner rule	61
Million bd.ft. Inter- national $\frac{1}{4}$ -inch rule	66
31.0" to 40.9" d.b.h. Million bd.ft. log scale, Scribner rule	44
Million bd.ft. Inter- national $\frac{1}{4}$ -inch rule	46
41.0" d.b.h. and larger Million bd.ft. log scale, Scribner rule	75
Million bd.ft. Inter- national $\frac{1}{4}$ -inch rule	78
All diameter classes Million bd.ft. log scale, Scribner rule	324
Million bd.ft. Inter- national $\frac{1}{4}$ -inch rule	357

Table 10.—All-timber volume on commercial forest land  
by kind of material, 1949

Kind of material	Volume
	<u>Million cubic feet</u>
Live all timber	
Primary growing stock	572
Secondary growing stock	4
Total	576
Salvable dead all timber	4
Total all timber	580



Table 11.--Commodity drain of live saw-timber volume and primary growing stock on commercial forest land, by species group, 1948

Species group	Live saw-timber volume						Primary growing stock		
	Cutting drain	Logging residual	Commodity drain <sup>1/</sup>	Cutting drain	Logging residual	Commodity drain <sup>1/</sup>	Cutting drain	Logging residual	Commodity drain <sup>1/</sup>
	Thousand board feet, log scale, Scribner rule			Thousand board feet, International $\frac{1}{4}$ -inch rule			Thousand cubic feet		
Softwoods	54,460	7,788	62,248	58,905	8,423	67,328	10,250	1,251	11,501
Hardwoods	79	11	90	91	13	104	14	2	16
Total	54,539	7,799	62,338	58,996	8,436	67,432	10,264	1,253	11,517

<sup>1/</sup> Total of cutting drain and logging residual.

Cutting drain is the portion of the inventory volume removed from the woods in the form of timber products.

Logging residual is the portion of the inventory volume cut or killed in logging that is not removed from the woods.



## FOREST SURVEY PROCEDURE

The procedure used in the second Forest Survey reinventory of Wahkiakum County was materially different from the procedures used in the initial inventory and first reinventory. This change in procedure accounts for some significant differences in both the forest-area and timber-volume statistics obtained. Therefore, a brief description of each of the procedures appears desirable.

### Initial Inventory

The initial inventory of the county was conducted in 1931 by what was known as the "compilation method." In this method existing information on forest types, timber cruises and other pertinent data was collected from private timber owners and various public agencies. These data were checked in the field for reliability, and were then adjusted to the specifications and standards of Forest Survey. Forest-type and timber-volume data for areas not covered by existing information were obtained through field reconnaissance.

All land in the county was classified as either forest or non-forest. Forest land was further classified as commercial or noncommercial; the commercial forest land by type, stand-size class, and in case of young-growth stands by stocking and age classes. These types and classes were delineated on 1-inch-to-the-mile base maps of each township. These township type maps were then superimposed over ownership-status plats and dot-counted to obtain forest-type-area statistics by ownership class. Type delineations on the township maps were traced on a base map of the county to form a county forest type map.

In-place, timber-volume estimates were based on the existing cruise data collected from private and public sources, on field cruises, and on ocular estimates. Volume of young-growth saw timber was computed by applying yield-table values, adjusted for age of stand, stocking density, and site, to type acreages.

### First Reinventory

The first reinventory included a complete revision of the forest type map of the county. For this revision, records of cutting and other forms of drain, since the original inventory, were obtained from various sources and verified in the field by ground reconnaissance. Areas on which the type had changed due to cutting,



restocking of cut-over or burned-over land, and ingrowth of immature stands were remapped on the ground. The ownership status was brought up to date. On the basis of the new ownership data and the revised forest type map, area statistics by forest types were recomputed.

Timber volume estimates for virgin saw-timber stands were based on cruise data collected during the original survey, adjusted for cutting and other drain. Volume estimates for immature stands were determined from yield tables adjusted for site quality, age, and density of stands.

### Second Reinventory

In the second reinventory complete revision of the forest type map was obtained through use of aerial photos and ground reconnaissance. About 55 percent of the county's land area was covered by aerial photos and these were used in the interpretation, classification, and mapping of forest types; types whose classification was in doubt and species compositions of stands were checked in the field. Type revision on the remaining 45 percent of the land area was done through ground reconnaissance. In the preparation of a revised type map, the delineations on the aerial photos were transferred to a 1-inch county base map through use of a photo projector; delineations on the field sheets from ground reconnaissance were traced. The new type map was then superimposed over a current ownership-status map of complete county coverage and a dot count made of forest type areas by ownership class.

Volume estimates each of live saw timber, primary growing stock, and salvable dead material were calculated by applying average per-acre volumes to the appropriate forest type acreages as determined from the revised type map. The average per-acre volumes for both saw-timber stands and pole-timber stands were obtained through a sampling procedure in which the stands were measured on randomly selected plots. Intensity of the sampling was so designed as to produce a total volume estimate in the county of a specified sampling accuracy. In the random selection of samples each individual saw-timber or pole-timber stand in the county had an equal chance of being selected. A sample consisted of a cluster of 3 one-fifth-acre circular plots spaced at regular 6-chain intervals. A total of 25 plot clusters, or 75 one-fifth-acre plots was taken in saw-timber and pole-timber stands.

Average per-acre volumes for seedling and sapling stands and non-stocked areas were obtained through an aerial-photo-plot sampling procedure. A total of 101 one-acre photo plots was taken in a modified systematic-random pattern. By photo interpretation, estimates were made of average number of trees per acre of both saw-timber and pole-timber size, average crown diameter, and total tree height; volume of the average tree was obtained from photo-volume tables.



## ACCURACY OF DATA

### Forest Area

In the reinventory of the county, in-place mapping of the forests and their classification by forest type, stand-size class, or condition class were on the basis of 100-percent coverage. Thus no error because of sampling was involved. Errors due to techniques or judgment in the field and in office computation of data were possible, but difficult to evaluate. Throughout all phases of the work close supervision and frequent checks assured a high level of accuracy and uniformity of standards.

Availability of aerial-photo coverage for more than half of the forest land in the county facilitated the mapping and classification. Preparation of a county forest type map, through projection of the detailed delineations from aerial photos and through tracing from ground reconnaissance field sheets, was materially aided by complete coverage of fairly recent U. S. Geological Survey base map quadrangles. Accuracy of the type map was contingent on the accuracy of the base map.

### Timber Volume

Estimates of timber volume obtained through the random sampling procedure employed may be subject to two types of error: (1) Errors in technique, tree measurements, plot-area measurements, judgment in cull and breakage allowances, volume tables used, and computation of data; and (2) sampling error. This latter is error which may result from the fact that the survey was made by sampling rather than by measuring all the trees. Errors of the type listed under (1) are either impossible or difficult to evaluate. However, in the survey every effort was made to minimize the effect of such errors through training, supervision, and checking. The sampling error can be calculated through statistical analysis of the sample-plot volume data.

Analysis of the volume data indicates that the sampling error, in terms of one standard error, of the total board-foot volume of live saw timber was  $\pm 10.77$  percent. In other words, the probabilities are two out of three that the actual volume if measured by a 100-percent cruise would have been within  $\pm 10.77$  percent of the estimated volume. Expressed in board feet, the sampling error was  $\pm 304$  million board feet, log scale, Scribner rule (10.77 percent of the total volume of 2,825 million board feet). The sampling error of the estimated total volume of primary growing stock was calculated to be  $\pm 8.99$  percent or  $\pm 51$  million cubic feet (8.99 percent of 572 million cubic feet).



## COMPARISON OF INVENTORIES

It is possible to make a direct comparison of certain of the statistical information from the second reinventory, in 1949, with that from the initial inventory, in 1931, and the first reinventory in 1940. However, direct comparison of some statistics is not feasible due to differences recognized between inventories in cruising specifications and standards of utilization.

### Forest Land

Through minor adjustments it is possible to bring the forest-land area statistics obtained in the 1931 and 1940 inventories to the same specifications of the 1949 inventory, thereby placing them on a comparable basis. The following table shows a comparison of the three sets of statistics by stand-size class:

Changes in Forest Land by Stand-size Class, Between Inventories

Inventory	Total forest land	Commercial forest land					Noncommercial forest land
		Total	Saw timber	Pole timber	Seedlings and saplings	Nonstocked areas	
	<u>Thousands of acres</u>						
1931	154	154	70	25	20	39	0
1940	158	158	78	19	26	35	0
1949	155	155	74	34	33	14	0

The differences in total forest land area between inventories--a 2.6 percent increase between 1931 and 1940, and a 1.9 percent decrease between 1940 and 1949--are due very largely to differences in interpretation in classification and in mapping procedures employed. There was little actual change in forest land area through clearing for agricultural use or reversion of agricultural land to forest land. The use of aerial photos in mapping more than half of the county's area in 1949 made possible greater detail and accuracy in classification of forest land versus nonforest land than was possible in ground surveys of the earlier inventories.

No definite trends are traceable in a comparison of areas of saw-timber and pole-timber stands as they appear in the tabulation. The respective areas of saw-timber stands, for example, are misleading in that there appears to have been an increase of 4 thousand acres in the period between 1931 and 1949, whereas there has actually been a decrease in the area of uncut stands. The 74 thousand acres of saw timber in



1949 included only 38 thousand acres of uncut stands; there was a total of 36 thousand acres of partially cut stands in which the reserve volume totaled 5,000 board feet or more per acre--the minimum volume of saw-timber stands. In 1940, the 78 thousand acres of saw timber included only 14 thousand acres of partially cut stands. Reduction in the area of saw timber through clear-cutting operations was offset to a considerable extent through ingrowth from pole-timber stands. In turn the area of pole timber was increased through ingrowth from seedling and sapling stands.

A very favorable trend in the restocking of cut-over and burned-over lands is revealed by the respective acreages of seedling and sapling stands and nonstocked areas. There was a significant increase in seedlings and saplings and an even greater rate of decrease in nonstocked area. In tracing the trend in area of seedlings and saplings one should, of course, consider the outgrowth of these stands to the next higher stand-size class--pole timber.

Some idea of the rate of restocking during the period 1931 to 1949 may be gained from the following table showing respective acreages of nonstocked lands.

Character of nonstocked areas	Acreage in inventory of--		
	1931	1940	1949
	<u>Acres</u>		
Recent cut-over areas <sup>1/</sup> (Cut 1920-31 (Cut 1930-40 (Cut 1945-49	24,163	18,290	4,710
Old cut-over areas (Cut prior to 1920 (Cut prior to 1930 (Cut prior to 1945	13,712	16,555	9,310
Nonstocked burned-over areas	1,050	375	320
Total	38,925	35,220	14,340

<sup>1/</sup> In the 1931 and 1940 inventories "recent cut-over areas" included all areas clear-cut during the stated period regardless of whether or not they had restocked by the inventory date. It is estimated that about 50 percent of the 1931 and 1940 acreages of recent cut-over areas were restocked by the inventory date. In the 1949 inventory "recent cut-over areas" included only clear-cut areas that had not restocked by the inventory date; restocked areas were classified as seedling and sapling stands.



### Timber Volume

Total timber volumes of live saw timber obtained in the 1949 inventory cannot be directly compared with those obtained in the 1931 and 1940 inventories. One reason is that the minimum diameter breast height of saw timber of 15 inches used in 1931 and 1940 was lowered to 11 inches in 1949. A second reason is that during the 18 years between inventories there has been a very significant intensification of woods utilization. In recent years logging operators have taken a greater portion of the stand volume out of the woods in the form of forest products. This improved utilization was recognized in the 1949 inventory through the use of volume tables that gave values from 10 to 20 percent higher for a tree of given size than did the volume tables used in the two earlier inventories.

Volumes each of live saw timber and primary growing stock obtained in the three inventories are shown in the following table. The 1949 live saw-timber volume has been adjusted to include only the volume in trees 15.0 inches d.b.h. and larger--the same minimum specification as used in the other two inventories. It has not been adjusted for differences in the volume table used.

#### Changes in Timber Volume Between Inventories

Inventory	Volume on commercial forest land of--	
	Live saw timber	Primary growing stock
	<u>Million board feet, log scale, Scribner rule</u>	<u>Million cubic feet</u>
1931	2,409	704
1940	2,210	646
1949	2,669	572

Although some of the increase in board-foot volume of live saw timber from 1931 to 1949, amounting to 10.8 percent, is due to growth, the major part is due to the use of revised volume tables in 1949 to take care of more intensive woods utilization. Another factor in the increase is the volume of young-growth trees that grew into the saw-timber class during the 18 years. And still another factor is the inclusion in 1949 of the volume in scattered saw-timber trees in the overstory of seedling and sapling stands, and on cut-over or burned-over areas classified as nonstocked; the volume of such trees was not included in the 1931 and 1940 inventories.



A more direct comparison of respective volumes of primary growing stock, which includes the volume in cubic feet of all pole- and saw-timber trees, is possible. Here there were only small differences in specifications and standards of utilization between the three inventories. The decrease in volume from 1931 to 1949 amounted to 18.8 percent.

## DEFINITION OF TERMS USED

### Land Area

#### Total Land.

Includes dry land and unmeandered water surface.

#### Forest Land.

Includes (a) land which is at least 10 percent stocked by trees of any size and capable of producing timber or other wood products, or of exerting an influence on the climate or on the water regime; and (b) land from which the trees described in "(a)" have been removed to less than 10 percent stocking and which has not been developed for other use. Minimum area of forest land recognized in reinventory of the Unit was 40 acres.

#### Nonforest Land.

Land that does not qualify as forest land. Minimum area recognized in the reinventory of the Unit was 40 acres.

### Forest Land Classes

#### Commercial Forest Land.

Forest land which is producing, or is physically capable of producing, usable crops of wood, economically available now or prospectively, and not withdrawn from timber utilization.

#### Reserved-Commercial Forest Land.

Commercial forest land managed for purposes other than timber production; the timber is not available for cutting because of statute, proclamation, or policy.



## Noncommercial Forest Land.

Forest land which is incapable of yielding usable wood products because of adverse site conditions, or so physically inaccessible as to be permanently unavailable economically, and not withdrawn for specified purpose.

## Reserved Noncommercial Forest Land.

Noncommercial forest land included in areas set aside by statute, proclamation, or policy, as recreational or museum areas.

### Forest Types

#### Forest Type.

A forest stand characterized by the predominance of certain key species--in terms of cubic volume for saw-timber and pole-timber stands, and in number of trees for seedling and sapling stands--or a forest condition such as nonstocked cut-over or burned-over land. The generalized forest types listed in table 3 are of the following composition:

Douglas-fir. Stands comprised of 60 percent or more of Douglas-fir by cubic volume or number of trees.

Western hemlock. Stands comprised of 50 percent or more of western hemlock by cubic volume or number of trees.

Sitka spruce. Stands comprised of 50 percent or more of Sitka spruce by cubic volume or number of trees.

Western redcedar. Stands comprised of 40 percent or more of western redcedar by cubic volume or number of trees.

True firs-mountain hemlock. Stands in which either noble fir, Pacific silver fir, or mountain hemlock or any combination of these species, comprise 50 percent or more of the cubic volume or number of trees.

White fir. Stands comprised of 50 percent or more of either white fir or grand fir by cubic volume or number of trees.

Hardwoods. Stands comprised of 50 percent or more of one of the merchantable hardwood species.

Nonstocked area. Cut-over or burned-over area on which the restocking, if any, is less than 10 percent density and which does not support a residual stand meeting minimum saw-timber requirements.

## Tree Classes

### Saw-Timber Tree.

Softwood or hardwood tree 11.0 inches d.b.h. or larger containing at least one 16-foot log to a variable top diameter inside bark approximating 40 percent of diameter breast height, but never less than 8 inches, and in which one-third or more of the gross board-foot volume is free from rot and defect.

### Pole-Timber Tree.

Softwood or hardwood tree 5.0 to 10.9 inches d.b.h. in which one-third or more of the gross cubic-foot volume is free from rot and defect.

### Cull Tree.

Live tree of saw-timber or pole-timber size that is unmerchantable because of defect or rot.

## Stand-Size Classes

### Saw-Timber Stand.

Stand of saw-timber trees having a minimum net volume per acre as follows: 5,000 board feet, log scale, Scribner rule, in any conifer species except the pines; 2,000 board feet in any of the pines; 1,000 board feet in hardwoods.

Old-growth saw-timber stand. Stand in which the majority of the cubic-foot volume is in trees more than about 180 years of age and larger than 21.0 inches d.b.h.

Large young-growth saw-timber stand. Stand in which the majority of the cubic-foot volume is in trees under about 180 years of age and from 21.0 inches to 40.9 inches d.b.h.

Small young-growth saw-timber stand. Stand in which the majority of the cubic-foot volume is in trees under 180 years of age and from 11.0 to 20.9 inches d.b.h.

### Pole-Timber Stand.

Stand failing to meet saw-timber-stand specifications but of at least 10-percent stocking of trees 5.0 inches d.b.h. and larger, with at least one-half the minimum stocking in pole-timber trees (5.0 inches to 10.9 inches d.b.h.).



### Seedling and Sapling Stand.

Stand not qualifying as either saw-timber or pole-timber stand but having at least 10-percent stocking of trees and with at least one-half the minimum stocking in seedlings and saplings (0 inch to 4.9 inches d.b.h.).

### Timber Volume

#### Live Saw-Timber Volume.

Includes all saw-timber volume except that in dead trees--measured in board feet.

Scribner rule. The common board-foot rule used in determining log-scale volume of saw timber in this region. This rule underestimates, particularly in case of timber of the smaller diameters, the volume of lumber that could be produced from the timber.

International  $\frac{1}{4}$ -inch rule. The standard board-foot rule adopted by the Forest Service in the presentation of Forest Survey volume statistics. Volumes in this rule approximate lumber tally.

#### Primary Growing Stock.

Net volume in cubic feet of live saw-timber trees and live pole-timber trees from stump to a minimum 4.0-inch top inside bark.

#### Secondary Growing Stock.

Net volume in cubic feet of all cull trees from stump to a minimum 4.0-inch top inside bark.

#### Salvable Dead.

A dead standing saw-timber tree in which at least one-third of the gross board-foot volume is free from rot or defect and in which sound volume totals at least 30 board feet.

#### Saw-Timber Volume.

Net volume in feet board measure of saw-timber trees of all species to a merchantable top. Includes both live and salvable dead saw-timber trees (standing and down).

### All-Timber Volume.

Net volume in cubic feet of saw-timber trees, pole-timber trees, and cull trees of all species from stump to a minimum 4.0-inch top inside bark. Includes both live and salvable dead saw-timber volume and pole-timber volume.

### Species.

Commercial tree species that grow in Wahkiakum County include:

#### Softwoods:

Douglas-fir (Pseudotsuga taxifolia).  
Western hemlock (Tsuga heterophylla).  
Western redcedar (Thuja plicata).  
Sitka spruce (Picea sitchensis).  
Pacific silver fir (Abies amabilis).  
Grand fir (A. grandis).  
Noble fir (A. procera).

#### Hardwoods:

Red alder (Alnus rubra).  
Bigleaf maple (Acer macrophyllum).  
Black cottonwood (Populus trichocarpa).

### Commodity Drain

#### Commodity Drain on Live Saw Timber.

The live saw-timber volume removed through cutting drain and logging residual during the inventory year.

Cutting drain. The live saw-timber volume entering into timber products during the inventory year.

Logging residual. The live saw-timber volume that is cut or killed during the inventory year by logging but not converted to timber products.

#### Commodity Drain on Primary Growing Stock.

The primary growing stock removed through cutting drain and logging residual during the inventory year.



Cutting drain. The volume of primary growing stock removed through cutting drain and logging residual during the inventory year.

Logging residual. The volume of primary growing stock that is cut or killed during the inventory year by logging but not converted to timber products.

#### Accuracy of Data

Sampling Error. The difference between a result obtained by sampling and a result obtained by a 100-percent measurement.

#### Comparison of Inventories

##### Ingrowth.

The volume, or number, of trees that have grown past the specified lower diameter limit of a stand-size class during a period of time.

##### Outgrowth.

The volume, or number, of trees that have grown past the specified upper diameter limit of a stand-size class during a period of time.